National Institute of Environmental Health Sciences

Global water resources affected by human interventions and climate change

Author(s): Haddeland I, Heinke J, Biemans H, Eisner S, Florke M, Hanasaki N, Konzmann M, Ludwig F, Masaki Y, Schewe J, Stacke T, Tessler ZD, Wada Y, Wisser D

Year: 2014

Journal: Proceedings of The National Academy of Sciences of The United States of America. 111 (9): 3251-3256

Abstract:

Humans directly change the dynamics of the water cycle through dams constructed for water storage, and through water withdrawals for industrial, agricultural, or domestic purposes. Climate change is expected to additionally affect water supply and demand. Here, analyses of climate change and direct human impacts on the terrestrial water cycle are presented and compared using a multimodel approach. Seven global hydrological models have been forced with multiple climate projections, and with and without taking into account impacts of human interventions such as dams and water withdrawals on the hydrological cycle. Model results are analyzed for different levels of global warming, allowing for analyses in line with temperature targets for climate change mitigation. The results indicate that direct human impacts on the water cycle in some regions, e.g., parts of Asia and in the western United States, are of the same order of magnitude, or even exceed impacts to be expected for moderate levels of global warming (+2 K). Despite some spread in model projections, irrigation water consumption is generally projected to increase with higher global mean temperatures. Irrigation water scarcity is particularly large in parts of southern and eastern Asia, and is expected to become even larger in the future.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3948259

Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Representative Concentration Pathway (RCP), Special Report on Emissions Scenarios (SRES)

Representative Concentration Pathway (RCP) : RCP 8.5

Special Report on Emissions Scenarios (SRES) Scenario: SRES A2

Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Security, Food/Water Security, Precipitation, Temperature

Food/Water Security: Agricultural Productivity

Temperature: Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

Freshwater

Geographic Location: ☑

resource focuses on specific location

Global or Unspecified

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Exposure Change Prediction, Other Projection Model/Methodology

Other Projection Model/Methodology: River runoff

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content